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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/550,514

09/23/2005

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4590-443

3006

33308 7590 11/25/2008  
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EXAMINER

ZHANG, YUANDA

ART UNIT

PAPER NUMBER

2828

MAIL DATE

DELIVERY MODE

11/25/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/550,514	<b>Applicant(s)</b> SCHWARTZ ET AL.	
	<b>Examiner</b> YUANDA ZHANG	<b>Art Unit</b> 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10-15 is/are rejected.
- 7) ☒ Claim(s) 9 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments with respect to claims 1-15 have been considered but are moot in view of the new ground(s) of rejection.
2. In response to Applicant's argument of a 102 rejection anticipated by Yntema et al, the Applicant has argued that Yntema et al do not disclose the following: (1) only two modes can propagate in the ring laser at the same time one with respect to the other; (2) a solid-state amplifying medium; (3) heat delivered to quartz crystal 28; (4) a feedback system. The Examiner respectfully disagrees. The Applicant has admitted that four counter propagating optical modes can propagate in the ring laser and the Examiner has indicated that two of the counter propagating optical modes can propagate in opposite directions at the same time. The limitations of "only two counter propagating optical modes can propagate in opposite directions at the same time" is not limited to mean the amplifying medium can only emit two counter propagating modes in opposite directions at the same time; therefore, the laser amplifying medium can emit more than 2 counter propagating modes and there can be other counter propagating modes propagating in opposite directions at a different time; (2) the argument is moot in view of the new ground rejection; (3) Yntema et al disclose a heat element 36 which supplies heat to heat shielding 32. As shown in figure 1, heat shielding 32 is wrapped around the laser gyroscope including the quartz crystal 28. Therefore, the quartz crystal 28 will be heated as a result of activating the heat element through the heat shielding; (4) Yntema et al disclose a feedback system through a control circuit 23 as electronic

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detection counters 20 and 21 outputting to a comparator 22 which in turn feeds electronic gyro circuitry 23 (col. 4 lines 15-20). Therefore, Yntema et al clearly anticipate all of the limitations required by claim 1.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-3, 5-8, 10 and 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yntema et al (US Patent 3,862,803) in view of Halldorsson et al (US Patent 5,960,022).

5. In re claim 1, with reference to figure 1, Yntema et al disclose a laser gyro comprising: an optical ring cavity including at least three mirror (mirrors 11-13), an amplifying medium (laser gain medium 24) and a feedback system (feedback system comprising counters 20 & 21, comparator 22, electronic circuit 23, temperature control 34, and heater 36), the cavity and the amplifying medium being such that only two counter-propagating optical modes can propagate in opposite directions at the same time one with respect to other inside said optical cavity (lights with different polarities travel in both clockwise and counter-clockwise directions in the ring laser cavity and also see argument above) (col. 6 lines 35-45), the feedback system allowing the intensity of the two counter-propagating modes to be kept almost the same (maintaining the temperature of the gyro controls the length of the ring cavity which keeps wave

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propagations in a constant intensity) (col. 5 lines 14-22), the feedback system comprising, inside the cavity, an optical assembly including a polarizing element (quarter wave plates 41 & 42) and a device (faraday cell 25) exhibiting a nonreciprocal effect that acts on the polarization state of the counter-propagating modes (col. 4 lines 28-35), wherein said optical assembly further includes a device (quartz crystal 28) exhibiting a reciprocal effect that also acts on the polarization state of the counter-propagating modes (col. 4 lines 35-43), the feedback system comprising control means (electronic circuit 23) for controlling at least one of the effects of said devices (electronic circuit 23 is controlling the supply of bias current to the faraday cell 25) (col. 4 lines 25-28). Yntema et al do not disclose a solid-state amplifying medium. However, Halldorsson et al disclose a diode-pumped solid-state ring laser gyroscope laser (see abstract). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the amplifying medium of Yntema et al with a solid-state amplifying medium as taught by Halldorsson et al in order to obtain a simplified and miniaturized structure (col. 4 lines 25-32).

6. In re claims 2 and 3, Yntema et al disclose the linear polarizer (wave plates 41 & 42) is one of the mirrors of the cavity (col. 5 lines 42-50 and see figure 3).

7. In re claims 5-7, Yntema et al disclose the reciprocal rotator, a birefringent optical plate in a non-planar cavity, exhibiting a reciprocal effect is a second linear polarizer (quartz crystal 28), the polarization direction of which is not parallel to that of the first polarizer (col. 4 lines 35-43), the feedback system consists of means for adjusting the non-reciprocal effect of the device exhibiting a non-reciprocal effect (col. 4 lines 25-28).

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8. In re claim 8, Yntema et al disclose wherein the device exhibiting a reciprocal effect is an optical plate exhibiting electrically controlled birefringence (quartz crystal 28).

9. In re claim 10, Yntema et al disclose wherein the device (Faraday cell 25) exhibiting a nonreciprocal effect consists of a material exhibiting the Faraday effect and polarized by an induction coil (figure) by an adjustable electrical current (col. 4 lines 25-28).

10. In re claim 12, Yntema et al disclose the cavity is monolithic, the counter propagating optical modes propagating, inside the cavity, only in a solid material (inherent).

11. In re claim 13, Halldorsson et al wherein the amplifying medium is based on neodymium-doped YAG (the solid-state amplifying medium is made of neodymium-doped YAG, col. 5 lines 25-26).

12. In re claim 14, Halldorsson et al disclose wherein the cavity is optically pumped by at least one diode laser (col. 5 lines 25-27).

13. In re claim 15, Halldorsson et al disclose wherein the cavity comprises at least one optical fiber in the form of a ring, which includes optical couplers for entry and exit of the counter propagating beams and of at least one optical pumping beam (glass fibers is used to couple pump light and guided into the ring laser gyro, col. 6 lines 63-65).

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14. Claims 4 and 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yntema et al (US Patent 3,862,803) and Halldorsson et al (US Patent 5,960,022) as applied to claim 1 above, and further in view of Nilsson (US Patent 5,177,764).

15. In re claim 4, Yntema et al / Halldorsson et al have disclosed the claimed invention except wherein the polarizing element is either an inclined glass plate, the angle of inclination on the optical modes then being approximately equal to the Brewster angle, or one of the faces of an element of the cavity cut at the Brewster angle of incidence. However, Nilsson discloses the linear polarizer is an inclined glass plate, the angle of inclination on the optical modes then being approximately equal to the Brewster angle (Col. 7 lines 55-62). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the polarizing element of Yntema et al / Halldorsson et al with an inclination of approximately equal to Brewster angle as taught by Nilsson in order to minimize back scattering of lights passing through the polarizer.

16. In re claim 11, Yntema et al / Halldorsson et al have disclosed the claimed invention except wherein the amplifying medium is base on neodymium-doped YAG and the material exhibiting the Faraday Effect are produced in the same material. However, Nilsson discloses the amplifying medium and the material exhibiting the Faraday Effect are produced in the same material (birefringent material is made of YAG which is the same as solid-state laser medium, Nd:YAG; Col. 9 line 23). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a neodymium-based amplifying medium and a Faraday rotator which is made of

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the same material to achieve a more coherent light beam, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

### ***Allowable Subject Matter***

17. Claim 9 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### ***Conclusion***

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.



Any inquiry concerning this communication or earlier communications from the examiner should be directed to YUANDA ZHANG whose telephone number is (571)270-1439. The examiner can normally be reached on Monday-Thursday, 7:30am-6:00p EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/YZ/  
11/19/08

/Minsun Harvey/  
Supervisory Patent Examiner, Art Unit 2828